(3) "substantially."[7]

See also Ekco Products v. Chicago Metallic Manufacturing Co., 347 F.2d 453, 454, 146 USPQ 146, 147 (7th Cir. 1965), discussed at § 18.05[3][a][iv] (baking pan with layer of iron-tin alloy "approximately 10 to 15 microinches");

For district court decisions, see Hay & Forage Industries v. New Holland North America, Inc., 25 F. Supp.2d 1170, 1180 (D. Kan. 1998) (AT LEAST APPROXIMATELY EQUIDISTANT; "Plaintiff urges the court to construe this phrase as encompassing a placement of the front pivotal connection at a point where the angles of the U-joints in the telescoping drive line are approximately equal. Defendant urges the court to construe this phrase to require a placement of the front pivotal connection at a point equidistant or within manufacturing tolerances of being equidistant to the opposite ends of the telescoping drive line."; "The court rejects both parties' proposed formulations. As a matter of law, the court construes the phrase 'at least approximately equidistant' to require a placement of the front pivotal connection 'at least reasonably close to' the exact point on the tongue that is equidistant from the opposite ends of the telescoping drive line. The ordinary meaning of the term approximately is 'reasonably close to.' Webster's Third International Dictionary, 107 (1986). Neither parties' arguments have convinced the court that any meaning of the term approximately other than its ordinary meaning should apply. The ambiguity of the term, if any exists, is inherent in claim 10, and cannot be cured by any strained construction by the court."); Central Soya Co., Inc. v. Geo. A. Hormel & Co., 205 USPQ 421, 426 (W.D. Okla. 1979), *aff'd*, 645 F.2d 847, 209 USPQ 915 (10th Cir. 1981) (claim to method requiring that product be expanded "approximately 100 to 150 percent" is infringed, not literally but under the doctrine of equivalents, by a method that expands product "an average of 53.6%, 62.56% or 74.46%" after selecting a product that inherently requires less expansion to achieved the intended result).

[7] E.g., Verve, LLC v. Crane Cams, Inc., 311 F.3d 1116, 1120 (Fed. Cir. 2002) ("SUBSTANTIALLY CONSTANT . . . THICKNESS" NOT INDEFINITE; EXTRINSIC EVIDENCE: in a patent on a push rod for an internal combustion engine, the patent claim required, inter alia, that the rod have "substantially constant wall thickness."; a district court erred in granting summary judgment that the claim was indefinite; the district court should consider "extrinsic evidence" on the meaning of "substantially."; "It is well established that when the term 'substantially' serves reasonably to describe the subject matter so that its scope would be understood by persons in the field of the invention, and to distinguish the claimed subject matter from the prior art, it is not indefinite. Understanding of this scope may be derived from extrinsic evidence without rendering the claim invalid."; "Expressions such as 'substantially' are used in patent documents when warranted by the nature of the invention, in order to accommodate the minor variations that may be appropriate to secure the invention. Such usage may well satisfy the charge to 'particularly point out and distinctly claim' the invention, 35 U.S.C. § 112, and indeed may be necessary in order to provide the inventor with the benefit of his invention."); Epcon Gas Systems, Inc. v. Bauer Compressors, Inc., 279 F.3d 1022, 61 USPQ2d 1470 (Fed. Cir. 2002) (SUBSTANTIALLY BELOW; SUBSTANTIALLY CONSTANT); LNP Engineering Plastics, Inc. v. Miller Waste Mills, Inc., 275 F.3d 1347, 1354, 61 USPQ2d 1193 (Fed. Cir. 2001) (SUBSTANTIALLY COMPLETELY WETTED; U.S. Pat. No. 5,019,450 and U.S. Pat. No. 5,213,889 on long fiber reinforced thermoplastics that are "substantially completely wetted."; In the art, there were three methods of measuring fiber wetting: visual inspection, a flexural modulus test, and a dispersal and length test; a district court did not err in interpreting "substantially completely wetted" as meaning "largely but not necessarily wholly, surrounded by resin" and as not limited to the flexural modulus test, even though the industry recognized the modulus test as a standard protocol; "The meaning of the word 'substantially' is 'largely but not wholly that which is specified.' *Webster's Ninth New Collegiate Dictionary* 1176 (9th ed. 1983). According to both parties' explanations of the technology, 'completely wetted'

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means 'wholly surrounded by resin.' Therefore, the claim language supports the correctness of the district court's interpretation of 'substantially completely wetted' as '[l]argely, but not necessarily wholly, surrounded by resin.' "); Ecolab, Inc. v. Envirochem, Inc., 264 F.3d 1358, 1366, 60 USPQ2d 1173 (Fed. Cir. 2001), discussed *infra* (SUBSTANTIALLY UNIFORM: "Ordinarily, 'uniform' means 'always the same as in form or degree; unvarying.' The American Heritage Collection Dictionary 1475 (3d ed. 1997)."; "Additionally, 'ordinarily . . . "substantially" means "considerable in . . . extent," American Heritage Dictionary Second College Edition 1213 (2d ed. 1982), or "largely but not wholly that which is specified," Webster's Ninth New Collegiate Dictionary 1176 (9th ed. 1983).' *York Prods., Inc. v. Cent. Tractor Farm & Family Cent.*, 99 F.3d 1568, 1573, 40 USPQ2d 1619, 1622 (Fed. Cir. 1996)."); Biotec Biologische Naturverpackungen GmbH v. Biocorp, Inc., 249 F.3d 1341, 1347, 58 USPQ2d 1737 (Fed. Cir. 2001) (U.S. Pat. No. 5,362,777 and U.S. Pat. No. 5,280,055 on polymeric material made from starch; the patents' claims required that there be a "substantially water free combination of starch with at least one additive": properly interpreted in view of the patent's prosecution history, the phrase "substantially water free" means less than 5%, and not, as the accused infringer argued, substantially less than 5%; during prosecution, the patent owner distinguished a prior art reference that described a starting material with a water content of 5% to 30%); Zodiac Pool Care Inc. v. Hoffinger Industries Inc., 206 F.3d 1408, 1418, 54 USPQ2d 1141, 1148-49 (Fed. Cir. 2000), discussed at § 18.07[4][c] (a flexible disk "substantially inward" of a peripheral edge; BRYSON, dissenting: "According to the court, the word 'substantially' must be interpreted to mean 'very much' or 'far,' so that the quoted phrase means 'very much inward, or far inward of the peripheral edge of the flexible disc.' The word 'substantially,' however, has another meaning: it can, and often does, mean 'largely,' 'essentially', or 'in the main.' *See Webster's New 20th Century Dictionary* 1817 (1983); *Webster's New World Dictionary of the American Language* 1454 (1962); *see also Black's Law Dictionary* 1428 (6th ed. 1990) ('essentially, without material qualification, in the main'); *Webster's Ninth New Collegiate Dictionary* 1176 (1983) ('largely but not wholly that which is specified'); 1176 (1983) ('largely but not wholly that which is specified'); *York Prods. Inc. v. Central Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1573, 40 USPQ2d 1619, 1622 (Fed. Cir. 1996). Under that interpretation of the term 'substantially,' the phrase 'substantially inward of the peripheral edge of the flexible disc' would mean 'mostly or mainly inward of the peripheral edge of the flexible disc.' "); Johns Hopkins University v. CellPro, Inc., 152 F.3d 1342, 47 USPQ2d 1705 (Fed. Cir. 1998), discussed at § 18.07[5][c] (substantially free); Pannu v. Iolab Corp., 155 F.3d 1344, 47 USPQ2d 1657 (Fed. Cir. 1998) ("substantially coplanar" allows angle up to 10%); General Mills, Inc. v. Hunt-Wesson, Inc., 103 F.3d 978, 983-84, 41 USPQ2d 1440 (Fed. Cir. 1997), discussed at § 18.07[3][d], § 18.07[4][c] ("substantial surface portion"); York Products, Inc. v. Central Tractor Farm & Family Center, 99 F.3d 1568, 1575, 40 USPQ2d 1619, 1622 (Fed. Cir. 1996), discussed at § 18.03[5][e][ii] ("Ordinarily, . . . 'substantially' means 'considerable in . . . extent,' *American Heritage Dictionary Second College Edition* 1213 (2d ed. 1982), or 'largely but not wholly that which is specified,' *Webster's Ninth New Collegiate Dictionary* 1176 (9th ed. 1983)."); Amhil Enterprises Ltd. v. Wawa, Inc., 81 F.3d 1554, 1562, 38 USPQ2d 1471, 1476 (Fed. Cir. 1996) (in view of the specification, prosecution history, and prior art, "substantially vertical face" in the patent's claim to a container lid "must be construed as the same as or very close to 'vertical face.' ").

For district court decisions, see ADCO Products, Inc. v. Carlisle Syntec Inc., 110 F. Supp.2d 276, 286 (D. Del. 2000), discussed *infra* ("substantially equal amounts" is not limited to "almost equal with a variation of only a few percent"); Ecolab, Inc. v. Amerikem Laboratories, Inc., 98 F. Supp.2d 569, 583-84 (D. N.J. 2000), *aff'd in part, vacated in part, reversed in part and remanded*, 264 F.3d 1358, 60 USPQ2d 1173 (Fed. Cir. 2001) ("substantially uniform cannot be confined to a precise numerical range."); Pehr v. Rubbermaid, Inc., 87 F. Supp.2d 1222, 1231 (D. Kan. 2000)

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("Webster's defines 'substantially,' the adverbial form of 'substantial,' as 'being largely but not wholly that which is specified.' Webster's Collegiate Dictionary 1174 (10th ed. 1999)."); Khedesian v. Bombardier Motor Corp. of America, 55 USPQ2d 1265, 1270 (C.D. Calif. 2000) ("substantially inclined longitudinal axis"; dictionary defines "substantially as 'being of considerable . . . degree, amount, or extent.' WEBSTER'S II NEW RIVERSIDE UNIVERSITY DICTIONARY 619, 1155 (1984)."); United States Filter Corp. v. Ionics Inc., 68 F. Supp.2d 48, 53 USPQ2d 1071 (D. Mass. 1999) ("substantially uniform size"); Lacks Industries, Inc. v. McKechnie Vehicle Components USA, Inc., 55 F. Supp.2d 702, 713-14 (E.D. Mich. 1999) ("substantially flush"); KX Industries, L.P. v. Culligan Water Technologies, Inc., 46 F. Supp.2d 308, 326, 329 (D. Del. 1999) (republished at 90 F. Supp.2d 461) (construing "substantially uniform particulate mixture" and "substantially uniform mixture" "according to their ordinary meaning," that is, "as meaning a largely—but not wholly—even distribution of particles."; construed in light of the prosecution history, "the phrase 'substantially uniform cross-section' . . . mean[s] less than a 0.010 inch variance in diameter . . ."); Mickowski v. Visi-Trak Corp., 36 F. Supp.2d 171, 178-79 (S.D. N.Y. 1999) ("substantially simultaneous viewing"; "The term 'substantially is a term of art used by the drafters of patent claims and must be interpreted in light of the specification and prosecution history. In this case, it is clear that the term 'substantially' has been included merely to bridge the gap between the abstract description of a method and its practical application in the real world. The term adds nothing to the claim, and it would be error for this Court to adopt [the accused infringer's] suggestion that 'substantially simultaneous' means 'not simultaneous.' The prosecution history makes clear that simultaneous display of pressure plotted as a function of position and pressure plotted as a function of time for the same shot was considered essential by the Patent Examiner to distinguish [the patentee's] invention from the prior art."); Evans Medical Ltd. v. American Cyanamid Co., 11 F. Supp.2d 338, 354 (S.D. N.Y. 1998), *aff'd*, 215 F.3d 1347, 52 USPQ2d 1455 (Fed. Cir. 1999) (unpublished), discussed *supra* ("the terms 'substantially 1:1' and 'about 1:1' mean that the proline and glutamic acid values are within 5% of each other—that is, the ratio between these values must fall within the range of 0.95:1 to 1.05:1."); Atmel Corp. v. Information Storage Devices, Inc., 997 F. Supp. 1210, 1228-29 (N.D. Calif. 1998) ("substantially all"; "Plaintiff contends that the term should be given its normal meaning of 'all but an insignificant amount.' Seeing no reason why the term should be given any other, out-of-the-ordinary meaning, the Court adopts plaintiff's construction."); Rohm & Haas Co. v. Lonza, 997 F. Supp. 635 (E.D. Pa. 1998), discussed at § 1807[5][c] ("SUBSTANTIALLY FREE OF"); Neles-Jamesbury, Inc. v. Fisher Controls International, Inc., 989 F. Supp. 393, 399-400 (D. Mass. 1998) ("points *substantially* on a geometric extension"; "Expert testimony presented by both parties demonstrated that a person skilled in the art of valve mechanics would understand that some clearance is necessary so that the plates do not scrape the valve casing as they rotate and as temperature fluctuates in the pipe. . . . Based upon the words of the claims and the testimony of the expert and the inventor, this Court construes 'substantially' to mean as close as economically efficient allowing for mechanical clearance to avoid contact between the plates and the valve body either through rotation or thermal expansion."); Dippin' Dots v. Mosey, 44 USPQ2d 1812, 1815-16 (N. D. Tex. 1997) ("Words such as 'substantially,' 'approximately,' and 'about' are often used in claims to prevent a potential infringer from avoiding literal infringement by making a minor modification."; "The definition of 'substantially' has been construed as 'the same or very close to.' *Amhil Enterprises, Ltd. v. Wawa, Inc.* . . . (Fed. Cir. 1996). The Court concludes that the phrase 'between substantially -10 degrees F. and -20 degrees F' allows for a reasonable deviation from exactly -10 degrees F. to -20 degrees F."); James River Corp. of Virginia v. Hallmark Cards, Inc., 915 F. Supp. 968, 989 (E.D. Wis. 1996) (SUBSTANTIALLY INTEGRATED; patent on pleated paper plates requiring "substantially integrated" layers; "One skilled in the art could recognize the difference between prior art pleats

In *Kolene Corp. v. Motor City Metal Treating Inc.* (1971),[8] the patent was upon an improvement on the "soft nitriding" process for treating metals. The

and the invention plate's pleats. It is permissible for there to be a range between the prior art and the preferred embodiment that is still included in the claim. In this context, 'substantially' allows for something short of absolute elimination of gaps and voids. It does require that comparison of photomicrographs reveal to one skilled in the art that the gaps and voids are distinctly reduced as compared to the prior art."); Johns Hopkins University v. Cellpro, 894 F. Supp. 819, 827 (D. Del. 1995) (jury instruction: "The court finds the words 'substantially free' can be understood using their common and ordinary meaning. The inventor chose to use the vague term 'substantially,' which regularly appears in patent claims. Furthermore, it is a term familiar to the common public. Therefore, the court will provide no additional instruction to the jury on the meaning of 'substantially free.' "), *later opinion*, 931 F. Supp. 303 (D. Del. 1996), *aff'd in part, vacated in part*, 152 F.3d 1342, 47 USPQ2d 1705 (Fed. Cir. 1998) (SUBSTANTIALLY FREE OF; "The court is reluctant to impose mathematical certainty on an ambiguous term when a patent applicant has strenuously avoided doing so."; "*substantially free* of mature lymphoid and myeloid cells" means that a cell suspension "must contain no more than 10% mature lymphoid and myeloid cells"; "Although the specification does not provide a specific percentage required for a cell suspension to be 'substantially free,' it does give a reference by which one skilled in the art could ascertain such a percentage. The specification states . . . 'Various assay techniques have been employed to test for the presence of the My-10 antigen, and those techniques have not detected any appreciable number (i.e. not significantly above background) of normal, mature human myeloid and lymphoid cells in My-10-positive populations.' [The inventor] testified that a person of ordinary skill in the art would interpret the phrase 'substantially free' in light of the practical limitations of the separation technique taught, which is the FACS method. He further testified that the FACS method would produce a cell population of 85-90% purity. This is consistent with the disclosure of a stem cell suspension of 90% purity in Table 9 of the specification."; "At trial, experts for both [parties] confirmed [the inventor's] testimony. . . . [The patentee's expert] stated that 'Let's say that everything over 10 [percent] would be outside that range.' [The accused infringer's expert] testified: 'Well, in my laboratory, it—it would mean 97-percent-plus pure, I have to say. We seem to have—I have a bit of a lack standard here and everyone seems to have agreed around 10 percent. . . . Obviously, there's going to be a range of interpretations here, but I think 10 percent is the—the bottom end.' ").

See also *Ex parte* North, 229 USPQ 71, 73 (Bd. Pat. App. & Int. 1985) (addition of the word " 'substantially' during reexamination as a codifier for 'rounded bottom wall' broadened the scope of the claim in violation of 35 U.S.C. § 305).").

[8] Kolene Corp. v. Motor City Metal Treating Inc., 440 F.2d 77, 169 USPQ 77 (6th Cir. 1971), *cert. denied*, 404 U.S. 886, 171 USPQ 325 (1971).

See also E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co., 711 F. Supp. 1205, 1226, 11 USPQ2d 1081, 1099 (D. Del. 1989) (claim to certain copolymers with a crystallinity of from 70% to 40%; the accused products had crystallinity values of 79.2%, 74.3%, 72.5%, and 71.4%; the products infringe under the doctrine of equivalents even though the inventor asserted during the prosecution of the patent that crystallinity values of 32% and 38% were outside of the lower range; "[T]he lower limit of the claimed range of crystallinities, 40%, serves a different purpose than the 70% limit at issue. The lower limit serves to distinguish the copolymers of the invention from 'rubber-like' linear copolymers . . . while the upper limit serves to distinguish the copolymers of the invention from ethylene homopolymers. . . . The Court has not been persuaded that there is any mathematical symmetry between the respective distinctions that the upper and lower limits of the claimed range serve to make. To require mathematical symmetry, for its own sake, between